

IN THE CLAIMS

Please amend the claims as follows:

Claim 1 (Currently Amended): A process for variably preparing mixtures of optionally alkyl-substituted ~~BDO, GBL and THF~~ butanediol (BDO), butyrolactone (GBL) and tetrahydrofuran (THF) by two-stage hydrogenation in the gas phase of C<sub>4</sub> dicarboxylic acids and/or derivatives thereof, which comprises

- a) ~~in a first step in the gas phase, hydrogenating in a gas phase~~ a gas stream of C<sub>4</sub> dicarboxylic acids and/or derivatives thereof over a catalyst at a pressure of from 2 to 100 bar and a temperature of from 200°C to 300°C in a first reactor in the presence of a catalyst in the form of shaped catalyst bodies having a volume of less than 20 mm<sup>3</sup>, said catalyst from 5 to 95% by weight of oxide of copper and from 5 to 95% by weight of an oxide having acidic sites, to give a stream ~~mainly~~ containing of optionally alkyl-substituted GBL and THF,
- b) removing any succinic anhydride (SA) formed by partial condensation,
- c) converting the products remaining predominantly in the gas phase in the partial condensation, THF, water and GBL, under the same pressure or under a pressure reduced by the pressure drops in the hydrogenation circuit and at a temperature of from 150 to 240°C, in a second reactor over a catalyst which  $\leq 95\%$  by weight of CuO and from 5 to 95% by weight of one or more oxides selected from the group of ZnO, Al<sub>2</sub>O<sub>3</sub>, SiO<sub>2</sub>, TiO<sub>2</sub>, ZrO<sub>2</sub>, CeO<sub>2</sub>, MgO, CaO, SrO, BaO, La<sub>2</sub>O<sub>3</sub> and Mn<sub>2</sub>O<sub>3</sub> to give a stream comprising a mixture of BDO, GBL and THF,
- d) removing the hydrogen from the products and recycling it into the hydrogenation,
- e) ~~distillatively separating by distillation~~ the products, THF, BDO, GBL and water, if appropriate recycling a GBL-rich stream into the second reactor or if appropriate discharging it, and working up BDO, THF and GBL ~~distillatively by distillation~~,

and setting the ratio of the products, THF, GBL and BDO, relative to one another within the range from 10 to 100% by weight of THF, from 0 to 90% by weight of GBL and from 0 to 90% by weight of BDO only by varying the temperatures in the two hydrogenation zones and also ~~if appropriate~~ the GBL recycle stream.

Claim 2 (Currently Amended): The process according to claim 1, wherein the partial condensation of the ~~SA~~ succinic anhydride is designed as a circulation quench cycle.

Claim 3 (Currently Amended): The process according to ~~claims 1 or 2~~ claim 1, wherein the evaporation of the recycled GBL or GBL/water mixture is effected in a countercurrent apparatus, ~~preferably a stripping column~~, with the GBL/THF-laden cycle gas hydrogen.

Claim 4 (Currently Amended): The process according to ~~claims 1 to 3~~ claim 1, wherein the partial condensation of the succinic anhydride and the evaporation of the GBL or GBL/water recycle stream are combined in one apparatus, ~~preferably in a countercurrent stripping column with external quench circuit~~, and the succinic anhydride is discharged as the bottom effluent together with residual GBL, water and high-boiling secondary components.

Claim 5 (Currently Amended): The process according to ~~any of claims 1 to 4~~ claim 1, which is carried out continuously.

Claim 6 (Currently Amended): The process according to ~~any one of claims 1 to 5~~ claim 1, wherein the inlet temperature in the first reactor is at values of from 200°C to 300°C,

~~preferably from 235 to 270°C, and from approx. 5 to 15°C, preferably from approx. 10 to 15°C, below the hotspot temperature.~~

Claim 7 (Currently Amended): The process according to ~~any of claims 1 to 6~~ claim 1, wherein the temperature increase in the second reactor is not more than 90°C, ~~preferably not more than 40°C, in particular not more than 20°C.~~

Claim 8 (Currently Amended): The process according to ~~any of claims 1 to 7~~ claim 1, wherein the inlet temperature in the second reactor is at values between 150°C and 270°C, ~~preferably between 175°C and 195°C.~~

Claim 9 (Currently Amended): The process according to ~~any of claims 1 to 8~~ claim 1, wherein both hydrogenation stages are carried out at pressures of from 2 to 100 bar, ~~preferably from 2 to 60 bar, in particular from 15 to 35 bar.~~

Claim 10 (Currently Amended): The process according to ~~any of claims 1 to 9~~ claim 1, wherein the catalyst hourly space velocity of the first hydrogenation stage is in the range from 0.02 to 2 kg of reactant/l of catalyst hour, ~~in particular from 0.05 to 1 kg of reactant/l of catalyst hour.~~

Claim 11 (Currently Amended): The process according to ~~any of claims 1 to 10~~ claim 1, wherein the catalyst hourly space velocity of the second hydrogenation stage is in the range from 0.02 to 2 kg of reactant/l of catalyst • hour, ~~in particular from 0.1 to 1 kg of reactant/l of catalyst hour.~~

Claim 12 (Currently Amended): The process according to ~~any of claims 1 to 11 claim~~  
1, wherein the molar hydrogen/reactant ratio in the first hydrogenation stage is at values of  
from 20 to 650, ~~preferably from 20 to 200, in particular from 40 to 150, most preferably from~~  
~~50 to 100.~~

Claim 13 (Currently Amended): The process according to ~~any of claims 1 to 12 claim~~  
1, wherein the molar hydrogen/GBL ratio in the second hydrogenation stage is at values of  
from 20 to 1000, ~~preferably from 50 to 400, in particular from 100 to 300.~~

Claim 14 (Currently Amended): The process according to ~~any of claims 1 to 13 claim~~  
1, wherein the reactor used in the first hydrogenation stage is a fixed bed reactor, ~~preferably a~~  
~~tubular reactor~~, a shaft reactor, a fluidized bed reactor or a reactor having internal heat  
removal, ~~in particular a shaft reactor.~~

Claim 15 (Currently Amended): The process according to ~~any of claims 1 to 14 claim~~  
1, wherein the reactor used in the second hydrogenation stage is a fixed bed reactor,  
~~preferably a tubular reactor~~, a tube bundle reactor, a fluidized bed reactor or a reactor having  
internal heat removal, ~~in particular a shaft reactor.~~

Claim 16 (Currently Amended): The process according to ~~any of claims 1 to 15 claim~~  
1, wherein the volume of the individual shaped body in the first hydrogenation stage is  
~~< 10 mm<sup>3</sup>, preferably < 6 mm<sup>3</sup>.~~

Claim 17 (Currently Amended): The process according to ~~any of claims 1 to 16 claim~~  
1, wherein the CuO [[<]] ~~is less than~~ 80% by weight, ~~preferably < 70% by weight, in~~

~~particular from 10 to 65% by weight, of CuO, and [>] is more than 20% by weight, preferably > 30% by weight, in particular from 35 to 90% by weight, of an oxide having acidic sites are present.~~

Claim 18 (Currently Amended): The process according to ~~any of claims 1 to 17 claim~~ 1, wherein the oxide having acidic sites is Al<sub>2</sub>O<sub>3</sub>.

Claim 19 (Currently Amended): The process according to ~~any of claims 1 to 18 claim~~ 1, wherein the catalyst of the first hydrogenation stage is one or more ~~further~~ metals or a compound thereof, ~~preferably an oxide~~ from the group consisting of the elements of groups 1 to 14 of the Periodic Table of the Elements ~~are present in the catalyst, preferably a substance from the group consisting of ZrO<sub>2</sub>, TiO<sub>2</sub>, CaO, Na<sub>2</sub>O, Mn<sub>2</sub>O<sub>3</sub>, BaO, SiO<sub>2</sub> and MgO.~~

Claim 20 (Currently Amended): The process according to ~~any of claims 1 to 19 claim~~ 1, wherein the ~~shaped catalyst body~~ is in the form of an extrudate.

Claim 21 (Currently Amended): The process according to ~~any of claims 1 to 20 claim~~ 1, wherein the catalyst of the second hydrogenation stage, in addition to CuO, oxides selected from the group of ZnO/Al<sub>2</sub>O<sub>3</sub> mixtures, delta-, theta-, alpha- and eta-modifications of Al<sub>2</sub>O<sub>3</sub>, and mixtures which comprise Al<sub>2</sub>O<sub>3</sub> and at least one component from the group of SiO<sub>2</sub>, TiO<sub>2</sub>, ZrO<sub>2</sub> on the one hand and from the group of ZnO, MgO, CaO, SrO and BaO on the other, or which contain at least one component from the group of SiO<sub>2</sub>, TiO<sub>2</sub>, ZrO<sub>2</sub> on the one hand and from the group of ZnO, MgO, CaO, SrO and BaO on the other.

Claim 22 (Currently Amended): The process according to ~~any of claims 1 to 4~~ claim 1, wherein the catalyst of the second hydrogenation stage comprises oxides selected from ZnO, ZnO/Al<sub>2</sub>O<sub>3</sub> mixtures in a weight ratio of from 100:1 to 1:2 and mixtures of SiO<sub>2</sub> with MgO, CaO and/or ZnO in a weight ratio of from 200:1 to 1:1.

Claim 23 (Currently Amended): The catalyst according to ~~any of claims 1 to 20~~ claim 1, which is activated by reduction, ~~preferably by treatment with hydrogen or a hydrogen/inert gas mixture~~, before or after installation into the reactor and before use in the hydrogenation reaction.